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ABSTRACT

According to the literature on cognitive style, of utmost importance to critical thinking is the organization of segments of information into a comprehensive whole. Creative thinking is a process in which a person becomes aware of a problem or difficulty, searches for possible solutions from past experience, and evaluates, modifies, and tests possible solutions. A description is given of a course in critical thinking given to 15 public school teachers. The teachers were introduced to theory and research in critical thinking, and they engaged in the process of embedding critical thinking skills in their content areas. In a cooperative learning situation, the class gained experience in reaching group consensus around the nature of the problem under investigation. Lectures on the nature and composition of creative thinking emphasized that the creative individual is able to return to the same problem and review it each time from different perspectives. Assignments were given to the class, in which the teachers were required to develop a critical thinking curriculum for their grade level that showed knowledge of learning styles and the influence of creativity on thinking. (JD)

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# INTEGRATING CRITICAL THINKING AND CREATIVE THINKING IN THE COOPERATIVE LEARNING MODEL

## IMPLICATIONS FOR ADDRESSING THE FRAME OF REFERENCE FOR THESE TWO DISTINCT PROCESSES

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## Theoretical Background

The need for recognizing the learner as an individual with unique mental representations of the environment requires that classroom instruction be adjusted to accommodate those individual needs. These representations are also modified by the influences of social and economic factors which come to bear on the learner's behavior. Hence, there should be a careful and critical analysis of how the learner selects, codes, reconstructs, and organizes information. The term applied to this phenomenon is cognitive style. Goldstein and Blackman (1978) defined learning style as the characteristic way in which individuals conceptually-organize the environment.

Knowledge of learning style can be a useful tool in designing curriculum materials. Also, an understanding on the part of educators of the creative process and its influence on learning will aid in effectively designing instructional materials that will provide alternative responses for students in a learning environment. Moreover, understanding the role that learning style plays in helping the learner to process information will provide the basis for developing curriculum materials that will enhance the learner's ability to identify concepts across content areas.

Traditionally, educational systems have given only limited attention to instructional procedures for meeting the specific learning needs of students in general. Keefe (1987) maintains that ultimately, education must come to grips with the different learning needs of individual learners. These learning differ-

ences flow from variations in individual intelligence, drive, skills and accomplishment as well as personal and family predisposition and cultural influences of the wider society. In spite of considerable dialogue, there is still substantial discontinuity between theory and practice in identifying and meeting these needs.

Directly in line with identifying the learner's cognitive style is a need for recognizing and assessing his or her ability to use critical thinking skills in approaching learning objectives. Critical thinking skills are not isolated concepts and precepts, but they are interrelated into the learner's total makeup.

In teaching critical thinking, the emphasis is on aiding the learner in producing and testing his or her own ideas. The learner must be able to analyze, formulate opinions and evaluate information effectively.

Of the utmost importance to critical thinking is organization. Organization helps the learner gather a full and comprehensive picture of the problem -- bits and pieces are pulled together. The learner is able to go beyond the given and develop new insight about the problem. Thinking is stimulated and many alternative responses are offered toward solutions to issues and events. Critical thinking encourages the learner to seek the missing link in information.

While the learner uses critical thinking to explore ideas and concepts, creative thinking is used to produce ideas and

concepts. The learner has attained creative thinking to the extent that one or more of the following conditions are met:

(1) the product the learner produces has novelty;

(2) the learner's thinking is nontraditional when there is a modification or rejection of previously accepted ideas;

(3) the learner's style of thinking is persistent over time, and is characterized by a high motivational level;

(4) and, the creative thinker is able to return to the same problem and view the problem each time from a different perspective.

Thus, Torrance (1978), defined creative thinking as a natural human process in which a person becomes aware of a problem, difficulty, or gaps in information for which there is no learned response; formulates, hypothesizes and searches for possible solutions from one's own past experience; evaluates, modifies, tests, and retests these possible solutions and communicates the results to others.

An examination of Torrance's definition of creative thinking indicates the basic skills that are most important for the process to be effective. First, the learner's ability to become aware of problems and gaps in information is critical. Further, the ability to define problems and gaps, along with the retrieval and combination of information from previous experiences, is important. Also, the ability to produce possible alternative solutions and develop criteria to evaluate these solutions, are necessary skills. Additionally, skills in conceptualizing, planning, and attending to details for implementing newly

developed solutions are vital to the total success of creative thinking. All of these skills are contributing factors to the learner's level of creative thinking and can be enhanced by the teaching process.

In order to aid the learner in developing creative thinking abilities, the learning environment must facilitate the expression of such abilities. Instruction must seek to provide an opportunity for the learner to bring into focus creative ways of looking at and solving problems. If instruction is based solely on established modes of learning, the creative thinker is restrained in the ability to employ creative skills in identifying concepts. Presenting a concept creatively requires that the instructor be willing to modify teaching techniques so as to encourage the learner to think, explore, and evaluate concepts. Children think and learn in several different ways. Educators must begin to focus on the need for a shift toward methods and instructional materials, tests, and assessment procedures that will take into consideration these individual differences.

In order to function successfully in society, the learner is required to master several fundamental concepts. Therefore, an understanding of the strategies that the learner employs in identifying concepts is an area that researchers continue to address, but not in the area of creative thinking and learning style. Research in this area should increase the available knowledge of how to gain the maximum amount of achievement from

all students involved in the learning process. A broader knowledge of the learner's thinking styles and response to the learner's individual needs, will create an atmosphere in which the learner can experience success. Such knowledge can provide information on the weaknesses and strengths of the learner's information processing skills which expand the basis for designing instructional material to enhance the learner's overall thinking skills. There is a continuing search for those factors that could enhance the student's academic performance. Knowledge of the student's perceptual skills in organizing and processing information may be gained through a greater understanding of cognitive style and its influence on learning. Suedfield (1971) notes that common to all theory and research on cognitive style is an emphasis on the structure rather than the content of thought. Structure refers to what knowledge is available. Claxton and Ralston (1978) views cognitive style as information processing habits which represent the learner's typical mode of perceiving, thinking, remembering, and problem solving techniques. Keefe (1987) maintains that learning styles illustrate the process of cognition. They tell how information is being processed. Styles are controlling mechanisms concerned with the manner or preference of performance.

There is general agreement among cognitive psychologists and educators as to the definition of cognitive style. This can be seen by the definition offered by Messick (1976) which identifies cognitive style in the framework of consistent patterns of

organizing and processing information. Coop and Sigel (1971) further elaborate Messick's definition by stating that cognitive style denotes consistencies in individual modes of functioning in a variety of behavioral situations.

These definitions of cognitive style are consistent in suggesting that there are individual differences in the manner in which the learner perceives, approaches, and conceptualizes a variety of stimuli. Substantiation of this view is seen in Messick's (1976) statement which asserts that there are several dimensions of individual differences in the performance of cognitive tasks. Messick maintains that these dimensions are called cognitive style and they represent a person's typical mode of perceiving, remembering, thinking, and problem solving. While there may be variations in how cognitive style is defined, the major focus within these variations pertains to establishing a mode of responding to information.

In view of the current emphasis given to individual instruction, cognitive style is a relevant variable when working with individual students, as non-analytical or low analytical students require greater assistance in differentiating complex stimulus (Kaplan, 1976). Kagan (1976) concluded the analytic/non-analytic mode of responding to concepts, corresponds to a dimension of cognitive style representing the learner's ability to differentiate relevant from irrelevant cues. Similarly, Witkin (1962) suggested individual differences in cognitive function.

Recognizing and providing experiences that utilize knowledge of the learner's cognitive style, critical thinking skills may increase the individual performance on concept identification tasks. Additionally, more effective implementation of instructional procedures may result from these efforts.

Classroom Teaching Model

Critical thinking requires that individuals become willing to examine information from a reflective and introspective stance. This mode of inquiry demands that impulsive reactions to information is decreased and a more clearly conceptionalization of an issue is explored. One of the ways in which we introduce the concept of critical thinking strategies for teachers is to have them engage in activities that will increase their ability to think critically on issues, phenomenons, and events.

During the spring semester a classroom of fifteen public school teachers, representing the secondary, middle, elementary, and kindergarten, schools on the Eastern Shore of Maryland took a course in teaching critical thinking at their respective grade levels. They engaged in the process of embedding critical thinking skills in their content areas, such as reading, math, science, history, biology, latin, english, and gifted education. At the beginning of the class students were introduced to theory and research in critical thinking, involving logical reasoning, inductive and deductive thinking, evaluation, judgement, decision making, analyzing, cause-effect relationships, generalizations, predictions, assumptions, reliable-unreliable information,

relevant-irrelevant information, structuring, inference, and hypothesizing. Students were taught questioning techniques to help them create a sense of inquiry from the kinds of questions they would ask. Structuring, organizing and developing questions were introduced to help students broaden their base for effective questioning techniques. The class content stressed the importance of the "question" in helping students to think critically. The question was viewed as a critical link toward motivating and stimulating thinking.

Lectures stressed the importance of connecting the question to the desired critical thinking skill the teacher wished to introduce to the students. Hypothesized questions stressed information that would help students develop predictions and inferences on issues and phenomenons. Students worked in small groups on deciphering, identifying, and focusing on one single problem and all of the supporting elements surrounding that problem. The question of being able to focus on a specific problem was critical to the process of developing the ability to isolate information according to its relevancy to the question at hand.

These small group activities encouraged cooperative learning in that each group received a specific problem and had to work with it over two consecutive class periods to arrive at solutions and insights. All projects in the class were graded on a group basis. One particular group activity that created a lot of concern for the students was an activity that involved their

ability to critically review and evaluate the problems surrounding the Oliver North case. This particular activity was designed to help students develop the ability to analyze and evaluate information effectively. It created enthusiasm and helped students to develop a point-of-view based on documented evidence. Students were given background material on the Oliver North case and were asked to discover fact from opinion during their inquiring in this activity. One group member recorded their impression of the problem, while another group raised questions concerning the problems of the Oliver North case. The class gained experience in reaching group consensus around the nature of the problem under investigation. In addition students saw critical thinking as a process that involved detailed analysis, concise evaluation, and interpretation.

The instructor provided lectures in creativity and divergent thinking. The nature and composition of creativity were examined. Creativity was defined in the context that the product the individual produces has a degree of novelty and originality. Flexibility and elaboration were viewed as essential components to the creative process. It was highlighted that the creative individual is able to return to the same problem and review it each time through different perspectives. Problems in the measurement and evaluation of critical thinking were explored.

A memorable phase of the course involved presenting research on memory retention and forgetting. The class received the information from a medical expert on the aging process and

thinking. Filmstrips highlighting various phases of Alzheimer's were shown. Dementia and communication were also explored by the medical expert and added new understanding toward the effects of the aging process on the retrieval and retention of information. After students received foundational information on the thinking process and the creative process they were asked to develop a critical thinking curriculum for grades K-12.

Example of assignment given:

Develop a critical thinking curriculum for grades K through 12 that would address knowledge of learning styles, and influence of creativity on thinking. Assignment should proceed in the following manner:

A. Each student should develop an outline of his or her proposed critical thinking curriculum.

B. The curriculum should include the following:

1. How critical thinking skills will be integrated into the following content areas:

Math
Science
History
Social Studies
Art
Music
Physical Education
Home Economics

C. A step-by-step plan for teaching the various components of critical thinking should be included in each content area. This would constitute the development of mini-lessons in each area that stress the various components and elements of critical thinking. For example, detecting biases, establishing cause and effect, distinguishing fact from opinion, moving from inductive to deductive reasoning, interpreting data, synthesizing data, adding structure, organizing data, drawing conclusions from data,

establishing alternative thinking to problem solving, developing inquiry investigation of data, effects of consequences.

D. The critical thinking curriculum should demonstrate how creativity will be enhanced and addressed in the various subject area. For example: how will lessons be presented in different and innovative ways to reach those students who are multi-dimensional in their thinking and orientation.

E. The above assignment addresses the concern of educators and administrators, accreditation boards who are concerned with implanting critical thinking into the curriculum. Students will be given time to do the research, writing and preparation for this assignment. Each student will present his/her critical thinking curriculum to the class as a unit.

F. This assignment should be typewritten and passed in to the Instructor on the day selected for presentation. Two copies should be made, one for the Instructor and one for the student.

G. Persons who are not in the teaching profession will develop a critical thinking curriculum in their area with modification in the guidelines as it pertains to the subject matter and content areas. This flexibility is provided as thinking is a lifelong process and can be implemented in a variety of ways.

Students were given two class periods to research and develop their K-12 curriculum. They were to embed the critical thinking skills in the content material so that these critical thinking concepts would not be isolated but integrated in the subject areas. All fifteen class members shared their K-12 critical thinking model with the class thus exposing each class member to a variety of ways to teach critical thinking at the various grade levels. Students viewed this as highly valuable. The instructor provided the following examples of how the stepwise format for developing specific critical thinking skills should be presented in their oral and written report.

I. Introduce the skill

A. Inference

II. Define the skill for the learner in order to develop a data base.

A. An inference can be defined as a conclusion that is based on and extends an observation.

III. Experienced with skill in the content area.

A. Provide experience where learners can derive understanding of critical thinking skill from content materials. Help learners locate skill within the content area.

B. Ask for specific questions that will help learners locate the skill within the content.

At the conclusion of this course the students were very favorable in their evaluations and rated the course very high. In addition students requested that this course become a part of their teacher training curriculum. One positive comment concerning the course came from an elementary school teacher who remarked that this course was something realistic and something that can be used immediately in their classroom. Students also remarked that they would recommend the course to other school teachers in the public schools. This model of teaching critical thinking that allows students to actually do a model in their content area proved to be very effective.

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